AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph beginning on page 1, line 21 as follows:

However, from the viewpoint of energy use, the conventional gasification and slagging combustion furnace converts the ~~whole~~ entire amount of energy into heat as with a conventional incineration furnace. Thus, the conventional gasification and slagging combustion furnace has a limited efficiency of energy use. Further, the conventional gasification and slagging combustion furnace cannot produce storable energy.

Please amend the paragraph beginning on page 2, line 9 as follows:

When a raw material having a large amount of fixed carbon, such as coal or ligneous biomass, is gasified in a gasification apparatus, char containing a large amount of fixed carbon is produced in the gasification apparatus. Because such char has an extremely low combustion rate as compared to that of a volatile gas, char is accumulated in the gasification apparatus. Thus, produced char is problematic in operation of the gasification apparatus in many cases. For example, when the gasification apparatus comprises a fluidized-bed furnace, char is accumulated on a surface of a fluidized bed because char has a specific gravity smaller than a bed material in the fluidized bed. Therefore, even if incombustibles are to be withdrawn together with a bed material from a furnace bottom, char cannot be withdrawn from the fluidized-bed furnace, but only a bed material is withdrawn from the fluidized-bed furnace. Thus, a char bed is formed in the fluidized-bed furnace. Specifically, a fluidized bed having a large amount of ~~char~~ accumulated char is formed in the fluidized-bed furnace. Since char has a large particle diameter, a char bed inhibits fluidization of the fluidized-bed furnace and thus may cause a shutdown of the system.

Please amend the paragraph beginning on page 4, line 12 as follows:

~~Disclosure~~ Summary of the Invention

The present invention has been made in view of the above drawbacks. It is, therefore, an object of the present invention to provide a gasification system having a gasification furnace or chamber for gasifying various wastes such as municipal solid wastes, industrial wastes, and waste plastics, biomass, and combustible materials such as coal and refuse-derived fuel (RDF) to recover a valuable combustible gas, and a combustion furnace or chamber for combusting char and tar produced as a residue in the gasification furnace or chamber. The gasification system

returns a combustion gas discharged from a combustion furnace or chamber to the combustion furnace or chamber and to a gasification furnace or chamber so as not to release an exhaust gas to an atmosphere and can eliminate any chimneys.

Please amend the paragraph beginning on page 4, line 24 as follows:

According to a first aspect of the present invention, there is provided a gasification system having a gasification furnace for gasifying a combustible material to produce a combustible gas, and a combustion furnace for combusting char and/or tar produced by gasification in the gasification furnace. The gasification system also has a return line for returning a combustion gas discharged from the combustion furnace to the gasification furnace and the combustion furnace.

Please amend the paragraph beginning on page 4, line 30 as follows:

According to a second aspect of the present invention, there is provided a gasification system having an integrated gasification furnace. The integrated gasification furnace has a gasification chamber for gasifying a combustible material to produce a combustible gas, and a combustion chamber for combusting char and/or tar produced by gasification in the gasification chamber. The gasification system also has a return line for returning a combustion gas discharged from the combustion chamber to the gasification chamber and the combustion chamber.

Please amend the paragraph beginning on page 7, line 4 as follows:

~~Best Mode for Carrying Out~~ Detailed Description of the Invention

A gasification system according to embodiments of the present invention will be described below with reference to FIGS. 1 through 10.

Please amend the paragraph beginning on page 9, line 20 as follows:

When the amount of combustion gas to be supplied to the gasification furnace 1 is larger than ~~an~~ a ~~amount proper~~ proper amount to be supplied as a fluidizing gas to the gasification furnace 1; (i.e., when wastes have low heating values and the amount of combustion is large), the combustion gas may be cooled by a combustion gas adjustment unit to condense moisture in the combustion gas and thus reduce the volume of the gas so as to increase the concentration of the

combustible gas in the produced gas. Specifically, when wastes have low heating values, a large amount of combustible components in the wastes is required to be combusted in the combustion furnace in order to compensate for heat required for evaporation of moisture in the wastes and gasification and pyrolysis of the wastes with heat of combustion in the combustion furnace. Accordingly, the amount of combustion gas produced becomes large. For example, as shown in FIG. 2, the combustion gas adjustment unit in the form of a gas cooling apparatus 7 may be provided upstream of the booster 3 to cool the combustion gas. With the gas cooling apparatus 7, moisture in the combustion gas is condensed and removed to an exterior of the system. Accordingly, the volume of the gas is reduced so as to increase the concentration of the combustible gas in the produced gas. Thus, the gasification system according to the present invention can be applied to wastes having much moisture and low heating values.

Please amend the paragraph beginning on page 10, line 5 as follows:

Further, as shown in FIG. 2, the combustion gas adjustment unit in the form of a scrubber (gas cooling apparatus) 8 may be provided to cool the combustible gas. With the scrubber 8, moisture in the combustible gas is condensed and removed to an exterior of the system. Accordingly, the volume of the gas is reduced so as to increase the concentration of the combustible gas in the produced gas. Thus, the gasification system according to the present invention can be applied to wastes having low heating values.

Please amend the paragraph beginning on page 10, line 11 as follows:

When the amount of combustion gas to be supplied to the gasification furnace 1 is smaller than ~~an amount proper~~ a proper amount to be supplied as a fluidizing gas to the gasification furnace 1, i.e., when wastes have high heating values and the amount of combustion is small, a fluidizing gas tends to be insufficient in the gasification furnace 1. In such a case, steam (water vapor) or inert gas such as nitrogen or CO2 may be supplied to the gasification furnace 1 to compensate for an insufficient fluidizing gas. Specifically, when wastes have high heating values, only a small amount of combustible components in the wastes is required to be combusted in the combustion furnace in order to compensate heat required for evaporation of moisture in the wastes and gasification and pyrolysis of the wastes with heat of combustion in the combustion furnace. Accordingly, the amount of combustion gas produced becomes small. When a fluidizing gas is compensated for with steam in the gasification furnace 1, the steam is

not required to have high quality. Specifically, water may be sprayed on the combustion gas, which is circulated, to produce steam. In this case, the amount of heat to be recovered from the combustion gas line can be reduced, and hence it is possible to make the heat exchanger 4 compact in size. Alternatively, water discharged from a scrubber may be sprayed on a gas discharged from the combustion furnace 2 to produce steam for a fluidizing gas. In this case, contaminants in the water become dry ash, which is trapped by the dust collector 5 such as a bag filter. Waste water discharged from various processes, e.g., waste water from a waste supply device with squeezing wastes to remove water content from the wastes or waste water from a waste pit, may be sprayed on a gas discharged from the combustion furnace 2 for cooling the gas.

Please amend the paragraph beginning on page 11, line 2 as follows:

When the fluidizing gas of the gasification furnace 1 is heated, the amount of combustion in the combustion furnace 2 can be reduced. Thus, it is possible to obtain the same advantages as in a case where a raw material has a high heating value. Depending upon conditions, the heat exchanger 4 can be eliminated. Catalyst particles may be mixed into the fluidized beds in the gasification furnace 1 and the combustion furnace 2. The catalyst particles serve to decompose tar and remove toxic substances under a reducing atmosphere having a low temperature in the gasification furnace 1. The catalyst ~~particle~~ particles may include MgO, iron oxide, Al2O3, zeolite, CaO, or a catalyst having a noble metal, such as Ni or Co. The catalyst particles are regenerated under an oxidizing atmosphere having a high temperature in the combustion furnace 2 so as to recover deteriorated functions of the catalyst particles.

Please amend the paragraph beginning on page 18, line 29 as follows:

According to the third embodiment, since the fluidizing gas can be heated in the fluidizing gas heater 24, it is possible to reduce the amount of combustion of a raw material (wastes), which ~~are~~ is combusted in the gasification furnace 11, and also reduce the amount of oxygen to be supplied. This embodiment is particularly effective in a case where a raw material has a low heating value. Similar effects can be obtained when the concentration of oxygen in the fluidizing gas to be supplied to the combustion chamber 13 is increased.

Please amend the paragraph beginning on page 19, line 8 as follows:

FIG. 6 is a schematic diagram showing a gasification system according to a fourth embodiment of the present invention. The gasification system shown in FIG. 6 has a high-temperature furnace 25 disposed between the dust collector 14 and the scrubber 15 in the gasification system shown in FIG. 5. A produced gas is discharged from the dust collector 14 and introduced into the high-temperature furnace 25. The high-temperature furnace 25 is supplied with oxygen-containing gas such as oxygen, oxygen-enriched air, air, or mixed gas of oxygen and steam, and the produced gas supplied into the high-temperature furnace 25 is partly combusted. In this case, the temperature of the interior of the high-temperature furnace 25 is increased to 900 to 1400°C, preferably about 1200°C. Accordingly, tar in the produced gas is pyrolyzed into hydrogen, carbon monoxide, and low molecular hydrocarbon. In the high-temperature furnace 25, carbon monoxide or hydrocarbon such as methane in the produced gas reacts with steam (for example, shift reaction) so as to change the composition of the produced gas. Accordingly, the produced gas can contain a large amount of hydrogen. In order to promote such reaction, steam may be supplied to the high-temperature furnace 25. Thus, the high-temperature furnace 25 has a function to adjust the composition of the produced gas. Accordingly, a fuel gas having a desired composition can be obtained by adjusting conditions of the high-temperature furnace 25. A portion of ash in the produced gas is removed in the high-temperature furnace 25. Particularly, when the high-temperature furnace 25 has a temperature higher than about 1200°C, ash contained in the produced gas is melted into slag in the high-temperature furnace 25. The molten slag falls down into a tank located at a lower portion of the high-temperature furnace 25 to form granulated slag. The granulated slag is discharged from the high-temperature furnace 25 by a conveyer. When the high-temperature furnace 25 has a temperature lower than about 1200°C, ash is not melted in the high-temperature furnace 25. In such a case, the ash is recovered by an inertial dust collector in the high-temperature furnace 25 and discharged from the bottom of the high-temperature furnace 25. The discharged ash is delivered to the ash reservoir tank 21 and stored therein.